



## **Urban SIS**

## **Climate information for European Cities**

Intense rainfall, heat waves and air pollution are major concerns for cities in a changing climate. Urban SIS (Sectoral Information System) will demonstrate and put into production a method to downscale climate and impact indicators to the urban scale. The information will be delivered in a format useful for urban planners, or for consultants and urban engineers/scientist as input to local models or dimensional calculations for urban hazards driven by intense rainfall, heat waves and air pollution.

The impact of climate change influenced hazards are considered to be a major concern for urban infrastructure (buildings, transport systems, sewage and drainage systems) exposed to intense rainfall and river flooding, as well as for citizens's health due to the consequences of heat waves and air pollution.

The Urban SIS information is based on climate re-analysis and climate scenario data, downscaled to be useful for individual cities. The Essential Climate Variables (ECVs) for urban downscaling include hourly ~1x1km<sup>2</sup> fields of:

- precipitation (also expressed as snow)
- water vapor
- urban temperature
- wind speed and direction
- surface radiation budget
- regional background concentrations of  $NO_2$ ,  $O_3$ ,  $PM_{10}$  and  $PM_{2.5}$
- regional scale soil moisture and river discharge

From these ECVs a series of statistical indicators – e.g., extreme values, their expected frequency and return period are calculated for present and future conditions, so that the spatially distributed information can be used directly by decision makers and urban planners, without

a more detailed modelling and data processing. The statistical elaboration of the basic ECVs into more user-friendly impact indicators has been specified by the infrastructure and health sectors, e.g. through workshops and interviews with stakeholder representatives. Examples are rainfall extremes given as Intensity-Duration-Frequency (IDF) curves, storm movements over the city and the areal affected, daily minimum and maximum temperature, exposure to particle  $PM_{2.5}$  pollution etc.

The Copernicus Climate Change Service (C3S) will combine observations of the climate system with the latest science to develop authoritative, quality-assured information about the past, current and future states of the climate in Europe and worldwide. It will provide key indicators on climate change drivers to support European adaptation and mitigation policies in a number of sectors. ECMWF operates the C3S on behalf of the European Union and will bring together expertise from across Europe to deliver the service.

**Urban SIS** is a proof-of-concept project C3S 441 Lot3, to serve principally the infrastructure and health sectors acting in European cities.

http://urbansis.climate.copernicus.eu/









The demonstration consists of three pilot cities, but the Urban SIS service is proposed to be developed for all major European cities and available through the Copernicus Climate Data Store.

The proof-of-concept project includes the following tasks:

- Downscaling ECVs fields over a 150-1. 200 km domain covering the city, for 5-10 year windows (present and future conditions) and with output as hourly 1x1 km<sup>2</sup> grids:
  - running HARMONIE weather/ climate model with detailed land use characteristics
  - offline simulation of regional air quality model MATCH with local emissions
  - simulation with the hydrological model HYPE including upstream catchment areas
- 2. Validation of downscaled ECVs information (comparisons with measurements for historical periods).
- 3. Specification of requirements from modelers and end-users of urban ECVs and impact indicator data to assure useful Urban SIS information as input to local models and to urban assessments.

- 4. Statistical processing of ECVs information to impact indicators, with demonstrations of its usefulness in urban planning.
- 5. Data storage, web access and visualization through the CDS portal.
- 6. Demonstration that the Urban SIS ECVs and impact indicator information fit as input to urban assessments like
- surface runoff/drainage system
- water treatment plant capacities and spill
- health impact studies for overflow pollution from sewage water plants
- river discharges / flash floods / flooding after intense rainfall
- high resolution radiant temperature in cities
- local scale air pollution modelling
- health impact studies for heat waves and air pollution

Pilot cities are Bologna, Italy; Stockholm, Sweden; and Amsterdam-Rotterdam, Netherlands. The project runs from 15 October 2015 to December 31 2017.

## **Urban SIS partners**

- Swedish Meteorological and Hydrological Institute, SE
- University of Reading, UK
- University of Umea, SE **♦**
- ARPAE, IT
- University of Bologna, IT
- WSP, SE
- Veryday, SE





















